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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOR KLT NO.	CONFIRMATION NO.
09/993,410	11/26/2001	Makoto Katayama	50395-124	6868

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McDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER
CALEY, MICHAEL H

ART UNIT PAPER NUMBER
2871

DATE MAILED: 07/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/993,410

Applicant(s)

KATAYAMA ET AL.

Examiner

Michael H. Caley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 06 May 2003.

2a) ☒ This action is **FINAL**.

2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-10 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1,2 and 6-10 is/are rejected.

7) ☒ Claim(s) 3-5 is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on 26 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some * c) ☐ None

1) ☒ Certified copies of the priority documents have been received.

2) ☐ Certified copies of the priority documents have been received in Application No. _____.

3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____

4) ☐ Interview Summary (PTO-413) Paper No(s) _____

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other:

DETAILED ACTION

Response to Arguments

Applicant's arguments, see Amendment, filed 5/6/03, with respect to the rejection(s) of claim(s) 1-10 under U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn to claims as amended. However, upon further consideration, a new ground(s) of rejection is made in view of O'Keefe et al. (U.S. Patent No. 6,246,826 "O'Keefe").

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Keefe et al. in view of Aksyuk et al. (U.S. Patent No. 6,173,105 "Aksyuk '105").

Regarding claim 1, O'Keefe discloses an optical device for giving attenuation having:

a substrate (Figure 1 element 50, Figure 2A element 40);

an optical circuit, the optical circuit being formed on the substrate and divided

into a first optical circuit (Figure 1 element 22, Figure 2A element 20), and a second optical circuit (Figure 1 element 26, Figure 2A element 24);

an optical element having an optical attenuating function, the optical element being movably disposed inside the groove at a location between the core elements (Figure 1 elements 22 and 26); and

an actuating means, comprising a comb-shaped electrode, for actuating said optical element (Figure 2B elements 22, 26, and 33).

O'Keefe fails to disclose the optical circuit as having a core and a cladding and divided into two portions such that the core is divided into two core elements by a groove that traverses the core. O'Keefe teaches alternative input and output means such as an optical fiber in addition to the ball lenses described in a preferred embodiment and illustrated in Figure 1. Additionally, Aksyuk '105 teaches an embodiment of a similar optical attenuator in which the optical circuit comprises waveguides as proposed (Figure 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have constructed the attenuating device as proposed. O'Keefe discloses a possible modification to the attenuator as having optical fiber as the input and output device. A groove within an optical waveguide, such as taught by Aksyuk '105 would have been a straightforward method of embodying such a modification. As anticipated by O'Keefe one would have been motivated to embody the attenuating device within an optical fiber as an engineering expediency, making the attenuator a versatile device accommodated for a variety of purposes. For instance, using an optical fiber instead of ball lenses would have been advantageous for applications such as optical communication and WDM systems as discussed by Aksyuk '105.

Regarding claim 6, O'Keefe discloses the optical attenuating function of the optical element as such as to cause the optical element to essentially perform an intercepting operation against signal light (Figures 3A and 3B).

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Claims 2 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Keefe in view of Aksyuk and in further view of Chai (U.S. Patent No. 6,480,662 "Chai").

Regarding claim 2, O'Keefe discloses all of the claimed limitations except for the light receiving surface of the optical attenuation elements as exhibiting discretely differing optical attenuation amounts. Chai teaches a design of a variable attenuator shutter element (Figure 2; Column 2 lines 29-42).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a shutter element such as taught by Chai, having discretely differing optical attenuation amounts, in the attenuator disclosed by O'Keefe. O'Keefe teaches a variety of shapes for the shutter element including rectangular, such as taught by Chai. Such a shutter would be advantageous for reasons taught by Chai such as an easily controllable and lower cost fabrication process due to the use of a patterned opaque layer over varying the coating thickness.

Regarding claim 7, O'Keefe fails to disclose the shutter surface as bumpy. Aksyuk '105 discloses the shutter surface as capable of scattering incident light such that it does not reenter the emitting waveguide (Column 2 lines 14-18). Additionally, Chai discloses a bumpy surface due to the patterned metal film on a transparent substrate (Column 2 lines 21-28)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have made the shutter surface bumpy in order to scatter the incident light. Such surfaces are old and well known in the art and would be advantageous in an application in which the shutter is configured perpendicular to the path of light. One would have been motivated to provide such a surface in an embodiment of such a device in which the shutter plane is

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perpendicular to the path of light such that the light does not re-enter the input waveguide for reasons as are old and well known in the art.

Regarding claim 8, O'Keefe discloses the blade of the shutter as gold coated to maximize reflectivity. Thus, it would have been inherent that the light-receiving surface of the optical element that receives the signal light is equal to or less than 20 dB.

Regarding claim 9, O'Keefe fails to disclose the polarization dependence loss of the optical device as equal to or less than 0.2 dB regardless of the given optical attenuation amount. However, such a characteristic would have been inherent of O'Keefe's optical attenuator in order to provide the lowest possible polarization dependence loss, providing an equal loss among all wavelengths.

Regarding claim 10, O'Keefe discloses a maximum value of the optical attenuation amount as equal to or greater than 40 dB (Figure 5).

Allowable Subject Matter

Claims 3-5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 3 and 4, the prior art fails to disclose or suggest incorporating an optical attenuator as proposed in claim 1 in which the optical circuit portion includes a Mach-Zehnder interferometer having arms in which a variably optical attenuation means produces a thermal phase shift.

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Regarding claim 5, the prior art fails to disclose or suggest incorporating an optical attenuator as proposed in claim 1 in which the actuating means comprises a third comb shaped floating electrode placed between the first two comb shaped electrodes and away from the substrate surface supports the optical element.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael H. Caley whose telephone number is (703) 305-7913. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (703) 305-3492. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

mhc

mhc
July 9, 2003

[Handwritten mark]

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